GEOTIMES

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October 1960

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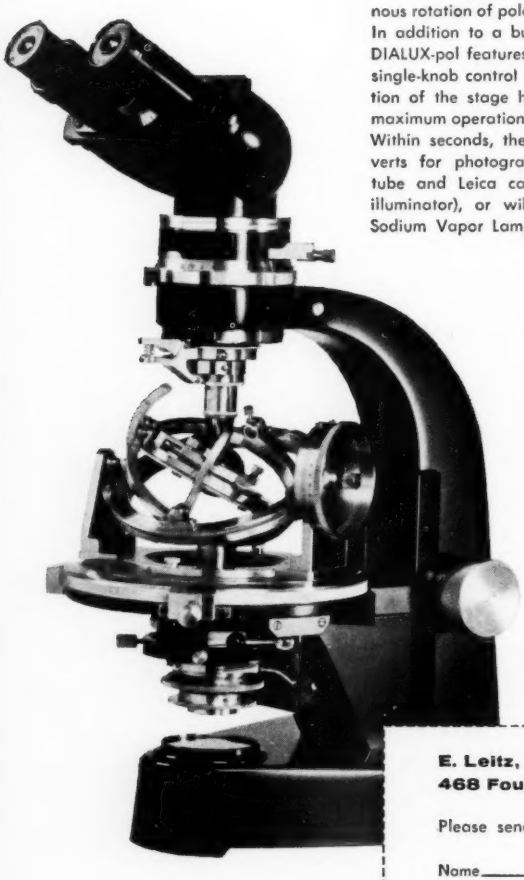

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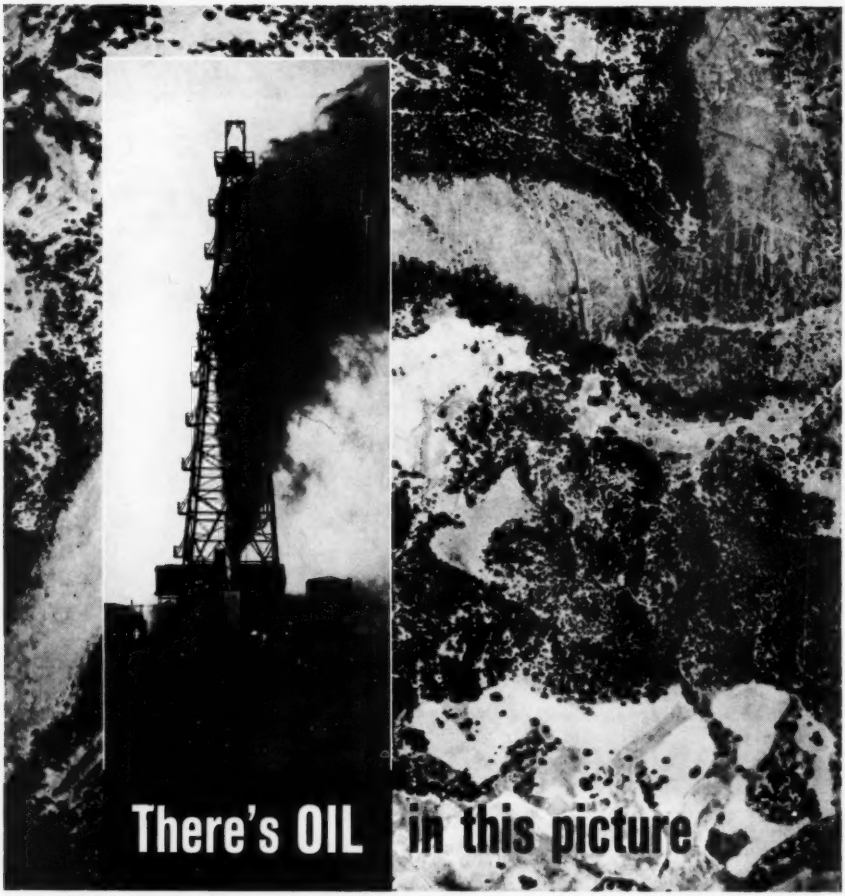

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Calendar

Cooperation of Society Secretaries in supplying meeting notices for GEOTIMES calendar is requested.

Oct. 13-15, 1960—OPTICAL SOC. OF AMERICA, Somerset Hotel, Boston, Mass.

*Oct. 14-16, 1960—CALIF. ASSOC. OF ENGINEERING GEOLOGISTS, 3rd Ann. Meeting, Univ. of Calif. at Berkeley. Write: CAEG, P.O. Box 4164, Sacramento 21, Calif.

Oct. 17-19, 1960—BIANNUAL SYMPOSIUM ON DRILLING & BLASTING, sponsored by mining dep'ts. of Univ. of Minnesota, Penn. State Univ., & Colo. School of Mines, Golden, Colo.

Oct. 18-21, 1960—ACerS: 13th Pacific Coast Regional Meeting, Ambassador Hotel, Los Angeles, Calif.

*Oct. 19-21, 1960—GULF COAST ASSOC. OF GEOL. SOC'S., 10th Ann. Convention, Buena Vista Hotel, Biloxi, Miss. Host: Miss. Geol. Soc. Theme: "The Future of Gulf Coast Oil." Technical sessions, entertainment and post meeting field trip. Write: A. E. Blanton, Gen. Chrmn., P. O. Box 422, Jackson, Miss.

Oct. 20-21, 1960—AIME: Los Angeles Basin Sect., Fall Meeting, Huntington Sheraton Hotel, Pasadena, Calif.

*Oct. 31-Nov. 3, 1960—GSA: Ann. Meeting, in conjunction with PS, MSA, GS, SVP and SEcG, Denver Hilton Hotel, Denver, Colo. Field trips before and after the meetings, also local excursions. Write: E. D. McKee, U.S. Geol. Survey, Federal Center, Denver, Colo.

Nov. 3-4, 1960—AAPG: Pacific Section, Ann. Meeting, Ambassador Hotel, Los Angeles.

Nov. 7-10, 1960—SEGp: 30th Ann. Internat. meeting, Moody Convention Center, Galveston. Write: W. B. Lee, Jr., Gulf Oil Corp., Dr. 2100, Houston 1, Tex.

Dec. 2-3, 1960—N.A.G.T., Texas Sect.—Texas Acad. of Sci.; Texas Christian Univ. Campus, Fort Worth, Texas.

Dec. 26-31, 1960—AAAS, Annual Meeting, New York City.

1961

Feb. 8-10, 1961—CANADIAN INST. OF SURV. & PHOTOGRAMMETRY, Ann. Meeting, Ottawa, Ont.

Feb. 10, 1961—12th ANN. SYMPOSIUM ON HIGHWAY GEOLOGY, University of Tennessee, Knoxville; Write: R. A. Laurence, USGS, Room 11, P. O. Bldg., Knoxville 2, Tenn.

Feb. 19-23—AIME: Annual Meeting, Chase and Park Plaza Hotels, St. Louis, Mo.

Feb. 26-Mar. 2, 1961—AIME: Soc. of Petrol. Eng., Ann. Meeting, Chase & Park Plaza Hotels, St. Louis.

Mar. 5-10—ASP-ACSM: Annual Meeting, Shoreham Hotel, Washington, D. C.

Mar. 21-30—AMER. CHEM. SOC., 139th Meeting, St. Louis, Mo.

Mar. 20-24—SEVENTH NUCLEAR CONGRESS, Chicago, Ill.

April—OHIO ACAD. OF SCIENCE, Geol. Sect., Univ. of Cincinnati, Ohio.

*April 13-15, 1961—GSA: SE SECTION Ann. meeting, Andrew Johnson Hotel, Knoxville, Tenn. Sponsored by Univ. of Tenn. and Tenn. Division of Geology. Papers—2 days, field trips —1 day. Write: Harry J. Klepser, Dept. of Geology, Univ. of Tenn., Knoxville.

April 17-19—CIM: Annual General Meeting, Chateau Frontenac, Quebec City, Quebec.

April 20-21, 1961—AIME: Soc. of Petrol. Eng., East Texas-Lou.-Ark., gas technology symposium, Tyler, Texas.

April 23-27—ACerS: 63rd Annual Meeting, Royal York Hotel, Toronto, Ontario.

April 24-25, 1961—AIME: Southwest Mineral Industry Conf., Las Vegas, Nevada.

April 24-27—AAPG-SEPM: 46th Ann. Meeting, Hilton Hotel, Denver, Colo.

May 4-5, 1961—AIME: Soc. of Petrol. Eng., oil recovery conf., Midland, Texas.

May 25-26—AIME: Joint Meeting Rocky Mountain Petroleum Sects., Salt Lak eCity, Utah.

1960 SCHEDULE OF FIELD TRIPS

For additional field trips held in conjunction with meetings, see those items marked with an asterisk under meeting calendar.

Oct. 14-16—NEW MEXICO GEOL. SOC., trip to Chama Basin area of N.-cent. N.M. to study strat. and econ. geology of rocks Precambrian through Tertiary. Assemble at Taos, Oct. 13, disband at Cuba. Write: Clay T. Smith, N.M. Inst. Min. & Tech., Socorro, N.M. Guidebook.

Oct. 15—ILLINOIS STATE GEOL. SURV., trip to study stratigraphy and structure of Harrisburg region of Saline County, Ill.

Oct. 15—SEPM, PERMIAN BASIN SECT., trip to Brazos River Valley of N.-cent. Texas to study Post-Avis Cisco rocks strat. and sedim. Write: Richard D. Jones, Box 832, Midland, Texas.

Oct. 19-20—GULF COAST ASSOC. OF GEOL. SOCS., trip of Coastal Mississippi and Alabama to study recent marine sediments and Cenozoic. Write: A. E. Blanton, P.O. Box 422, Jackson 5, Miss. Guidebook.

Oct. 22-23—FIELD CONF. OF PENNSYLVANIA GEOLOGISTS, trip to Appalachian Piedmont along Susquehanna R. to study struct. mechanisms. Write: Dr. D. U. Wise, Franklin & Marshall Coll., Lancaster, Penna. Guidebook.

Nov. 18-20—ROSWELL GEOL. SOC., trip to south-central New Mexico to study Pennsylvanian stratigraphy. Write: M. D. Wilson, Shell, Box 845, Roswell, N.M. Guidebook.

Dec. 2-3—TEXAS ACAD. OF SCIENCE, no details.

Dec. 9-11—SOUTH TEXAS GEOL. SOC., trip to Medina and Val Verde Counties to study Cretaceous sediments with emphasis on Edwards and Glen Rose. Write: Porter Montgomery, Milam Bldg., San Antonio, Tex. Guidebook.

FIELD TRIP CALENDAR

Most of the information regarding field trips in this calendar appears through the courtesy and cooperation of the AAPG Field Trip Committee. Corrections, additions and new trip notices should be sent to George H. Fentress, Chairman, AAPG Field Trip Committee, P. O. Box 2585, Denver 1, Colo., with a carbon copy to GeoTimes Calendar, American Geological Institute, 2101 Constitution Ave., N.W., Washington 25, D. C.

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PHOTOGEOLOGY

By VICTOR C. MILLER, Miller & Associates, Inc., Denver, Colorado. Ready in Spring, 1961.

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Choice or Compromise?

The AGI Reorganization Executive Committee, in the constitution and bylaws which it proposed in its report of March 1960, made provisions for the future adoption of standards of certification of qualified individual members based on education, training and experience.

The reactions of geoscientists to these provisions varied widely. In some quarters it was viewed as a positive step (1) to curb infringement on the geoscientists field by registered engineers, (2) to upgrade the qualifications of the profession and (3) to improve stature of geoscientists in the public eye. Other individuals and groups opposed—some violently—the permissive wording which would enable certification standards to be adopted. Academicians constituted a large segment of this opposition and have expressed the fear that educational institutions and educators would become subject to standards of certification. Furthermore, the objectors say they fear licensing and registration.

And now—a different picture. While the opposition to the certification matter has been brewing a tempest in the AGI reorganization a group of geologists in another segment of the profession has been seriously considering a new society of geological engineers which, among other things, will (1) encourage studies and certification of curricula and (2) encourage registration and licensing of students graduating with degrees in geological engineering. Foremost among advocates of this new society and these objectives are representatives of ECPD-accredited departments offering geological engineering.

Currently these are over 200 degree-granting departments of geology-geophysics. Of these, 19 have a curriculum in geological engineering which has been accredited by the engineers (ECPD). About 70 schools are reported to offer some geology for engineers.

It will be interesting for our readers to speculate as to the impact of these two divergent views relative to certification on the future of the geosciences and geoscientists. Between the polar extremities of opinion lies a great deal of middle ground.

OUR COVER

Casts of Eocene mammal tracks in the "Strawberry Slab" from Northeastern Utah (see page 34).

Photo by courtesy of Shell News.

The AMERICAN GEOLOGICAL INSTITUTE is a non-profit professional service organization established and managed by the scientific societies in the fields of geology and geophysics in cooperation with the National Academy of Sciences-National Research Council. It is the instrument of the profession serving and advancing the welfare of the geoscientist in matters relating to education, professional responsibilities and government relations. It is an active member of the Scientific Manpower Commission. It also functions in the stimulation of public education and awareness of the earth sciences, through career literature, the scouting program and other channels of communication.

GEOTIMES is the news magazine of the geological sciences. It reports on current events in the earth sciences, public education and public relations efforts throughout the profession, as well as appropriate legislative and governmental issues. It announces scholarships, fellowships, publications and new developments. It provides a forum for discussion of timely professional problems, and affords a common bond between the many specialized groups within the earth sciences

LUNAR EXPLORATION

"The new science of Planetology is but one application of the old science of Geology"

by Roy G. Brereton [1]

Exploration of the moon, because of the state-of-the-arts in rocketry, propulsion, and general space technology, must evolve through several steps. The first step will be represented by a series of unmanned vehicles designed to impact on the moon, orbit the earth-moon system, orbit the moon, and finally to soft-land an instrument package on the lunar surface. The first step will provide most of the geological, astronomical, and biological environmental data required for planning a manned lunar mission. Table I lists the scientific experiments that should be accomplished during the first step of lunar exploration.

The second step in lunar exploration will be characterized by more powerful rockets and greater sophistication thus permitting manned exploration. Table 2 indicates the scientific experiments to be performed by the first moon-landing party. Generally speaking, the first objective of manned lunar exploration will be a geological and environmental reconnaissance of the landing area; therefore, the first men on the moon if we are to be practical and scientific in our approach, should be a geologist, a physicist, and an engineer. These men will survey the landing site, explore the area around it for resources that can be used for supplying and building the first permanent lunar base, and conduct geological and geophysical measurements for accurately determining the lunar environment. They will climb crater-like structures, walk the craggy surface of ancient lava flows, and disturb the dust of eons which has collected on the lunar surface.

Preliminary "hard-rock" geophysical work to be accomplished at the landing site will include:

1. Seismic survey to determine the elastic properties of surface and sub-surface rocks, depth of surface material, and the general seismicity of the moon.
2. A gravity survey to determine anomalous horizontal density contrasts and information on the lunar mass.
3. A magnetic survey.
4. Electrical surveys to locate fissures and cracks that might be hidden under surface dust.

The latter will resemble electrical surveys that are presently being carried out in the Arctic and Antarctic to locate fissures and cracks in the ice that are hidden under recent snowfalls.

An accurate survey of rocket types and their mineral and chemical composition will be made. This petrology and mineralogy study is extremely important for an evaluation of lunar resources and for ascertaining at an early date the potential of a lunar base. The moon's resources could be used to supply subsequent lunar exploration parties and provide indigenous material for building, growing food, making rocket fuel and oxygen, and resupplying many of the needs of a lunar colony. It is even conceivable that critical strategic minerals could be mined on the moon and shipped back to earth for processing and use.

Surface radiation studies, initiated in earlier, unmanned experiments, will be continued. Soft-landing vehicles will already have measured the amount of dangerous radiation coincident with the lunar surface. Continued studies of solar-lunar effects will be made, especially the effects of increased solar activity in the form of sun-spots and flares. A continuous observation will be made of all incident corpuscular radiation, and ultraviolet and infrared radiation. Infrared observations will be extended to a study of the temperature and how it varies from place to place, how it changes with time throughout the long lunar day, and how it varies with depth. These data will give a detailed picture of the lunar heat budget for the design of living and research facilities.

(Continued on page 27)

[1] Roy G. Brereton, Senior Geophysicist, Space Technology Division, Aerojet-General Corporation Azusa, California.

Table 1. Lunar experiments, unmanned.
(listed in order of importance)

EXPERIMENT	PURPOSE	TIME
Impacting	Measure near-earth and cislunar and lunar environmental parameters	Immediately
1. Radiation	Study all types of electromagnetic and corpuscular radiation to determine its effect on the lunar environment and biological organisms.	Continuing until package soft-landed - thereafter at reduced rate; 1960-1962 total of about 5 vehicles
2. Tracking and Positioning	Determine mass and provide reference point for other experiments - political	1960-1962 all flights
3. Atmospheric Press	Determine presence of atmosphere	1960 two flights
4. Magnetic Field	Determine magnetic fields of lunar and cislunar environment	1960-1962 about three flights
5. Meteor Particles	Measure the frequency and size of meteor particles	1960-1962 all flights
6. Flash Bomb	Political, mark position of impact, some information on physical property of surface material	1960 - 2 flights
7. Television	Close-up view of surface	1960 - 2 flights
Orbiting		First Vehicle, 1960
1. Photogrammetry	Study and map the lunar surface in visual and IR wavelengths	1960 for first crude picture continuing through 1963
2. Radiation	Amount and type of radiation surrounding the moon, albedo and heat-budget studies	1960-1963 all vehicles will carry some type of radiation detector
3. Magnetic Field	Map the magnetic field	Depending on results of impact experiment
4. Meteor Particles	Measure the frequency and size of meteor particles	All vehicles beginning in 1960 through 1963
5. Tracking and Positioning	Determine mass; reference point for other experiments, political	When practical, beginning in 1960
6. Electron Density	Measure the electron density	1961
7. Biological	Test the effect of extended space flights on biological organisms - i.e., effect of prolonged weightlessness is not known	1960-1963 continuing
Soft-Landing		Late 1961 and continuing until a lunar base has been established
1. Radiation	Study all types of electromagnetic and corpuscular radiation to determine its effect on the lunar environment and biological organisms	Continuing for all vehicles - First
2. Positioning	Selenographic reference point	Continuing for all vehicles
3. Trafficability	Determine the properties of the lunar surface that are important to vehicle movement	Continuing from 1961
4. Radio Beacon	Provide lunar reference point for future experiments	Continuing
5. Spectrograph	Determine density and constituents of the lunar atmosphere	1962
6. Meteor Particles	Measure the frequency and size of meteorites	1961 continuing for all vehicles
7. Televisioned Photography	Close-up pics of the lunar surface	1961
8. Biological	Test the effect of space and the moon on living organisms	Continuing for most vehicles from 1962
9. Virology	Test the lunar environment for dangerous organisms	Late 1962
10. Core Samples	Study small sample of lunar surface material	Late 1962

UNDERGRADUATE RESEARCH ON LANDSLIDES AT WHITTIER COLLEGE

by FREEMAN BEACH LEIGHTON[1]

A student-faculty team research project has measurably strengthened the geology program at Whittier College. This project is a part of the "Undergraduate Research Participation Program" in the sciences initiated in 1959-60 by the National Science Foundation. These continuing NSF programs are designed "to build the interest of superior students in scientific research, and to enhance their understanding of the scientific method and their ability to employ scientific investigative procedures. . . . Undergraduate participation implies that the undergraduate is not yet ready to carry on original investigation on his own, but that he can share genuine research experience with experienced research scientists . . . in progressively more independent roles."

Five Whittier College students participated in our one-semester trial project in 1959-60. Three students will participate for the *entire* school year in each of the succeeding three years. These undergraduates must be high-caliber science majors of upper division standing.

The heartening reaction of participants to the 1959-60 program stems not only from the commendable assistance rendered by NSF in the form of undergraduate "grant-in-aids," but also in part from the stimulating and flexible nature of the research problem and in part from the integrated team approach.

A generalized statement of the research problem is as follows:

WHAT: *A study of landslides in the Puente Hills* (bordering Whittier College on the north)

WHY:

1. In order to identify and map existent landslides.
2. In order to determine the detailed geometry, structure and lithology of selected landslides.
3. In order to determine the history of landslides in the historic and geologic past.
4. In order to determine the casual relationships of the landslides on the basis of their characteristics and history.
5. In order to recognize and identify locations susceptible to future landsliding.

Obviously, there is no immediate solution to a problem this broad. Partly in order that a product would emerge from the one-semester project, three unstable areas in different stages of landslide evolution were mapped on scales ranging from one inch equals 50 feet to one inch equals 100 feet. One of these slides is pictured in the accompanying photograph. Because the adjoining canyon revealed remarkable similar pre-slide conditions, it was also mapped in detail. The third area detailed appears to be in the early stages of moving en masse. Well-defined fracture and open fissure patterns have developed within the last five years. After one rainfall of the past winter, movement as much as 10 inches was measured.

The professional efforts of geologists who had mapped in this and nearby landslide districts provided impetus in the organization of the project during the summer and launching of the project during the fall.

The following were the principal steps involved in the first semester's work:

*1. Literature search and preparation of research outline by every participant.

†2. Evaluation and discussion of outlines.

†3. Identification and reconnaissance mapping of slides in limited areas.

†4. Plane tabling of selected slides. (aided by surveying classes)

*†5. Mapping in geological detail of selected slide areas.

[1] FREEMAN BEACH LEIGHTON, Chairman, Department of Geology, Whittier College, Whittier California.

*6. Description and analysis of rocks involved in the slide.
*7. Study of a particular phase of landsliding.
†8. Establishing rows of movement stakes by alidade and transit survey in two slide areas.
*9. Writing of a report.

† Indicates group efforts
* Indicates individual efforts

Joint efforts listed above were integrated with courses in surveying and structural geology and were augmented by weekly seminars and field trips to other slide areas. Participants averaged 15 to 20 hours per week on the project, of which approximately half this time was spent in the field.

The instructor served as both guide and active participant. On the first landslide the students and instructor worked as a team. Thereafter students had their choice of mapping another slide independently or pursuing another phase of landslide research in the laboratory. Three of the students did both. It was through this type of enthusiasm and dedication that these students discovered one of the rewards of research.

A similar program and approach is planned for the succeeding three years of the project. In addition to continued data-collecting in the slide areas already mapped, studies will be made of major slides in adjacent parts of the Puente Hills. Some occur in different geologic formations than the slides already mapped; hence, special effort will be made to relate them to the previously mapped slides in terms of type, lithology, structure and history.

It is recognized that subsurface investigations of slides are important, if not essential. Proposed grading operations will slice away one landslide and furnish a three-dimensional picture. In at least one other slide of major importance it is hoped that holes can be drilled and logged to check estimated slide depths, clarify the geometry, and permit precise measurements of complete stratigraphic sections.

Like many other geologic problems this one has the advantage of being a basic research project with noteworthy practical aspects. Landslide hazards in the Puente Hills have not been widely recognized because of limited land use and the obscurity of most slides. With the area on the verge of suburban development this project should help to increase public awareness of these geologic problems and focus attention on the application of geology to intelligent community planning.

This slide originated in 1949 as shown by aerial photographs taken before and after 1949. Future movements of the slide mass are imminent. Evidences of instability exist in adjoining canyon to left. Suburban development is now encroaching on these hills. (Photo by **John Shelton**)

NEW STATE GEOLOGIST

Joe Webb Peoples became the new Director of the Connecticut Geological and Natural History Survey on June 1 succeeding John B. Lucke who resigned from the post. Dr. Peoples is chairman of the Geology Department at Wesleyan University. The office of the Connecticut Geological and Natural History Survey is now Judd Hall, Wesleyan University and the mailing address is Box 128, Wesleyan Station, Middletown, Connecticut.

EMMONS FELLOWSHIP

The S. F. Emmons Memorial Fellowship in economic geology will be available for the academic year 1961-62. The Fellow may use the stipend ($2000) to support study and research in any university or institute approved by the committee. He should be qualified by training and experience to investigate some problem in economic geology, and will be expected to devote full time to the investigation. Its results may, if desired, be used as a doctoral dissertation.

Forms may be obtained from any member of the committee: Alan M. Bateman, Yale University; Chas. H. Behre, Jr., Columbia University; H. E. McKinstry, Harvard University. Applications and supporting letters should be submitted to the Committee not later than February 15, 1961, and should include a detailed statement of the problem to be investigated.

GEOLOGY at the JAMBOREE

The 56,000 Boy Scouts who attended the 5th National Jamboree near Colorado Springs, July 22 to 29, 1960, received a generous amount of instruction in geology and related subjects. The Geology and Weather exhibit at the Jamboree was one of four major exhibits built around the central theme of conservation of natural resources (GEOTIMES, *July-August 1960, p. 29*). Other major exhibits included Soil and Water, Forest and Range, and Fish and Wildlife.

The Geology and Weather exhibit consisted of nine stations, or separate displays devoted to the following subjects:

1. Weather
2. Climate
3. Topography
4. Rocks
5. Weathering and soils
6. Fuels
7. Minerals and metals
8. Water
9. Archeology

Each station included three to five large panels with painted backgrounds and attached specimens, models and photographs. The backgrounds were artistic, colorful, and designed imaginatively to appeal to the 12- to 16-year-old boy. Each station was manned by a professional earth scientist and one or more specially trained Explorer Scouts who alternated with the adult professional in giving 7 to 10-minute explanations of the material on display. The participation of the Explorer Scouts did much to stimulate the interest of the younger boys.

The topography exhibit showed how a topographic map is made and how it may be used in planning and executing conservation activities.

The rock exhibit described the origin and nature of sedimentary rocks and fossils, and the story of prehistoric life and evolution. The display also explained the difference between sedimentary and other types of rock and introduced the concepts of metamorphism, deformation and mountain building.

The exhibit on weathering and soils showed by means of diagrams and vivid, large scale photographs how soils develop from rocks under different conditions and how soils and surficial deposits provide a clue as to the nature of the parent rock.

The fuels exhibit showed how oil migrates from its place of origin to an anticline and some of the processes by which oil is discovered, extracted and processed. Emphasis was placed on secondary recovery practices.

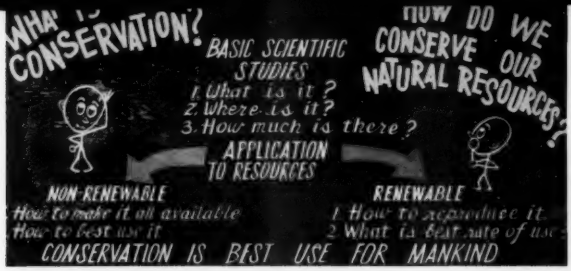
The minerals and metals exhibit explained the difference between minerals and rocks, and the difference between a mineral specimen and ore. It also described different kinds of ore occurrence and conservation practices employed in mining and processing ore. Modern geophysical methods of searching for ore were summarized.

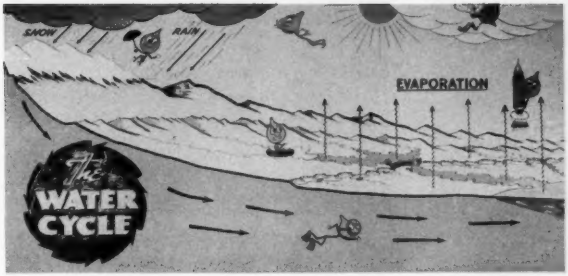
The water exhibit outlined the water cycle, discussed surface water and ground water, and introduced the subjects of quality of water and of conservation of water.

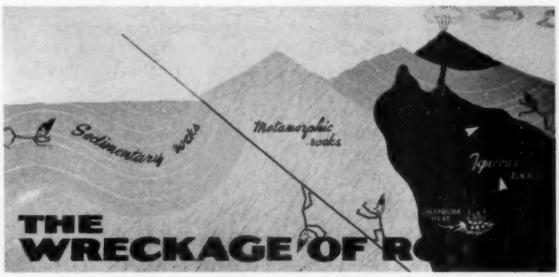
The archeological exhibit dealt with the history of ancient man as found in the plains States and along the Rocky Mountain front. Especial emphasis was given to the point that finds of archeological material should be reported to an archeologist and that excavations should be conducted only under expert supervision.

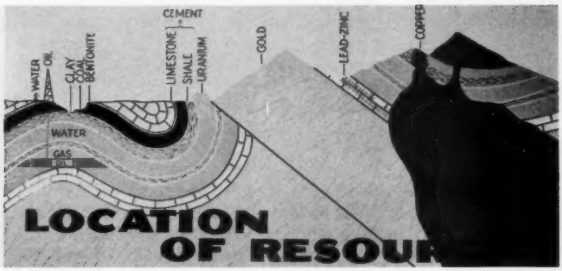
The complete tour of the Geology and Weather exhibit required 1¾ hours. The boys were escorted through in groups of 60 to 70 on a tight schedule. Except for occasional lulls on the first and last days of the Jamboree the exhibit was in constant use.

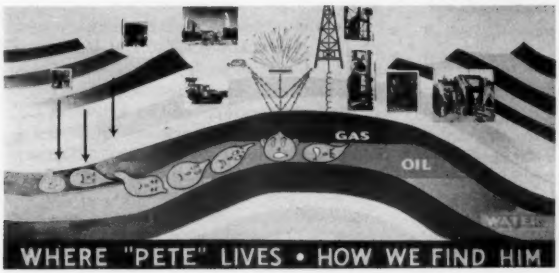
On emerging from the main exhibit the boys found themselves in an outdoor arena called the Conservation Carnival. This Carnival consisted of 36 participation ac-


CONSERVATION?
BASIC SCIENTIFIC STUDIES
1. What is it?
2. Where is it?
3. How much is there?
APPLICATION TO RESOURCES
HOW DO WE CONSERVE OUR NATURAL RESOURCES?
NON-RENEWABLE
How to make it all available
How to best use it
RENEWABLE
1. How to reproduce it
2. What is best rate of use
CONSERVATION IS BEST USE FOR MANKIND

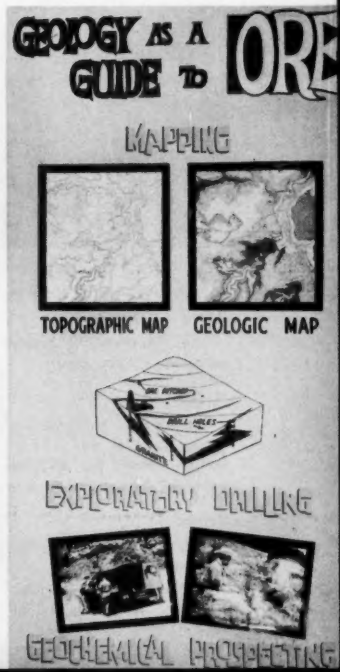


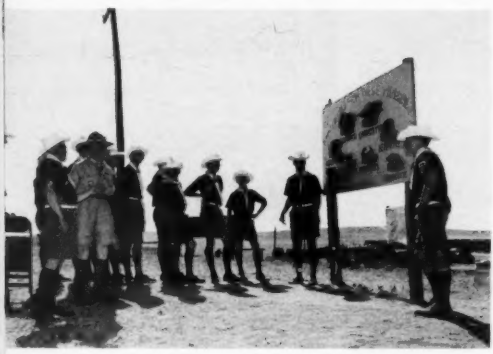






EXAMPLES OF CONSERVATION EXHIBIT PANELS





Top

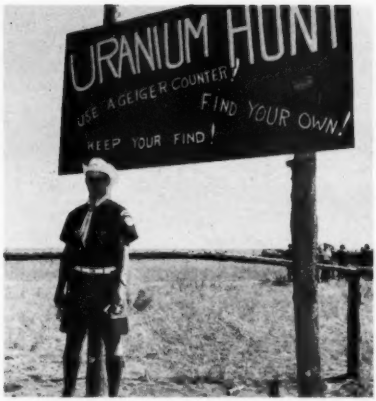
The Conservation Carnival area attracted an estimated 40,000 scouts.

Middle

The mineral collection game in the Conservation Carnival area. Baden Powell, Jr., son of the founder of the Boy Scout movement, third from left in light uniform and dark hat.

Bottom

Two Denver Explorer Scouts man a soil conservation station.



Charles R. Fiola of Denver was one of 80 specially trained explorer scouts serving guides in the conservation area.

Gerald M. Richmond, a Survey geologist, did a terrific job as chairman of the geology project. As a scouter, he also worked for many weeks during the past year training the explorer scout guides in geology.

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tivities or games dealing with various phases of conservation. It was operated entirely by Explorer Scouts. About nine of these activities had to do with geology.

The most popular of the activities was collecting mineral specimens from simulated mine dumps and outcrops. Twenty-two tons of ore was imported into the area for this purpose. Some very beautiful specimens of bornite were contributed by the Ray Mines Division of the Kennecott Copper Company; magnetite was contrib-

Two of the geology staff are pictured above; they are George E. Prichard, left, and P. L. (Skip) Keller, right.

uted by the Colorado Fuel and Iron Company from its mines in the Laramie Range, Wyoming; molybdenite was contributed by the Climax Molybdenum Company; oil shale was contributed by the U. S. Bureau of Mines; and gilsonite was contributed by the American Gilsonite Company. A booklet describing the geologic significance of these minerals was supplied by Williams and Heintz Lithographic Division, Kauffman Press.

To gain access to the collecting sites the boys had to study a board containing about ten large mineral samples and to guess what metals might be obtained from any particular mineral. The American Petroleum Institute supplied 250,000 small polyethylene bags, each labeled with the name and source of the mineral to be enclosed. These bags proved to be almost as popular as the minerals themselves, but as one can well imagine, they were employed, not only to hold mineral specimens, but also to hold patches, badges and other trading items that were exchanged between boys from different parts of the country.

Another popular game was the fossil board, which exhibited a suite of distinctive fossils to which simple names such as clam, snail, scallop, or reptile had to be applied. If a boy could bat 80 percent he was permitted to select a fossil from a large assortment. The demand exhausted several bushels of fossils before the Carnival week was out.

Other activities consisted of hunting uranium with geiger counters; measuring the flow of water in wells and in streams; the identification of rocks in a cross section through the Garden of the Gods; and how to stake a claim.

The Geology and Weather exhibit was designed, constructed and operated by the Earth Sciences profession. In addition to the companies and agencies previously mentioned, the U. S. Geological Survey, the American Association of Petroleum Geologists, the American Geological Institute, the Rocky Mountain Association of Geologists, the Colorado Scientific Society, Colorado College, the Denver Museum, the Colorado Oil and Gas Conservation Commission, the National Supply Company, the Hughes Tool Company, the Frontier Refining Company, and the Humble Oil and Refining Company, all provided substantial backing in one way or another. The following individuals contributed generously of their time and talent: Chalmer L. Cooper, Chairman of the AGI Boy Scout Committee; Gerald M. Richmond, Chairman of the geology exhibit project; J. Andrew Singley and Charles Fiola, topography exhibit; Paul R. Barnett and Wm. J. Hasler, rock exhibit; Richard Van Horn and John C. Reed, Jr., weathering and soils exhibit; George E. Prichard, P. L. (Skip) Keller, and Curtis Elder, petroleum exhibit; C. Gilbert Bowles and Richard P. Sheldon, minerals and metals exhibit; Harold E. McGovern, Paul T. Voegeli, Joe L. Blattner, Wm. A. Beetem and Donald A. Morris, water exhibit; and John R. Stacy, design and art.

Geologists Exam Announced by Civil Service Commission

A new examination is announced for geologists rates GS5 and GS7 salaries; GS5 $5335; GS7 $6345. The examination is to be used for filling positions in the Department of the Interior. The closing date for receipt of applications is December 1, 1960. The examination will be given January 9, 1961. Apply to *Executive Secretary, Board of U. S. Civil Service Examiners, Geological Survey, Department of the Interior, Washington 25, D. C.*

Pomona Honors Anderson

The Chief Geologist of the United States Geological Survey, Dr. Charles A. Anderson received an honorary doctor of science degree at the 67th commencement exercises of Pomona College where he studied as an undergraduate.

GSA MEETING IN DENVER

Features field excursions

The 1960 meetings of the Geological Society of America, Mineralogical Society of America, the Paleontological Society, the Society of Vertebrate Paleontology, the Society of Economic Geologists, and the Geochemical Society will be held at the Denver Hilton Hotel in Denver, Colorado, on Monday, Tuesday and Wednesday, October 31, November 1-2, 1960.

Returns from Circular 1 announcing the annual meeting indicate an attendance of about 3000 men. About 1200 of the ladies will plan to join the fun in Denver.

Abstracts received to date total over 400 as compared to 320 in 1959, and 300 in the previous years.

Many more additional functions will broaden the scope of the convention interest. Field trips and excursions are planned as follows:

FIELD TRIPS

Field Trip A-1: *Geology of West-Central Colorado*—Three days, November 3, 4, and 5. About 675 miles.

Field Trip A-2: *Geology of South-Central Colorado*—Three days, October 28, 29, and 30. About 575 miles.

Field Trip A-3: *Tectonics and Economic Geology of Central Colorado*—Three days, November 3, 4, and 5. About 525 miles.

Field Trip B-1: *Quaternary Geology of the Front Range and Adjacent Plains*—Two days, October 29 and 30. About 215 miles.

Field Trip B-2: *Geology of Laramie Range and Laramie Basin*—One-and-a-half days, October 29 and 30. About 330 miles.

Field Trip B-3: *Mineral Deposits of the Climax District*—One-and-a-half days, October 27 and 28. About 230 miles.

Field Trip C-1: *Stratigraphy of the Colorado Springs-Canon City Area*—One day, October 28. About 270 miles.

Field Trip C-2: *Engineering Geology of the Colorado-Big Thompson Project*—One day, October 29. About 190 miles.

Field Trip C-3: *Precambrian Geology of Central City-Idaho Springs Area, Front Range*—One day, October 30. About 100 miles.

Field Trip C-4: *Fossil Vertebrates and Sedimentary Rocks of Front Range Foothills*—One day, November 3. About 45 miles.

A book entitled *Guide to the Geology of Colorado* will be on sale before and at the convention. It will describe each of the rock systems of Colorado and include road logs for each of the trips to be conducted. This book and a supplementary volume. *Road Logs of Colorado*, available as a matching set (cloth or paper bound), provide a comprehensive review of Colorado geology.

LOCAL EXCURSIONS

Excursion No. 1: American Stratigraphic Company's well-sample log laboratory. Hourly: To see preparation of samples, logging techniques, and resultant product. Sign up in lobby afternoon of October 31. AmStrat is a short walk from Convention Headquarters. No charge.

Excursion No. 2: Ohio Oil Company Research Laboratory at Littleton. Half day. Limited to two groups of 30 each, morning and afternoon, November 1. Estimated cost: $1.00 bus fare.

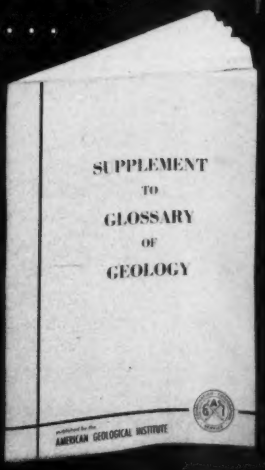
Excursion No. 3: Denver Federal Center. Full day or half day depending on interest of participant. See facilities of U. S. Geological Survey, Bureau of Reclamation Laboratory and Bureau of Mine Coal Laboratory. November 2, busses will leave morning, noon and afternoon. Estimated cost: $1.00 bus fare.

Excursion No. 4: Rail Trip from Denver through Moffat Tunnel to Winter Park and return. Special train to view structure along mountain front in steeply dipping strata and in crystalline rocks. Open to wives and guests.

LADIES' PROGRAM

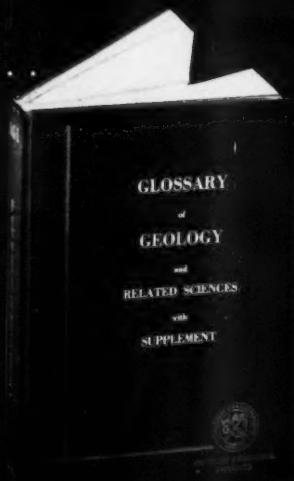
An attractive program is planned for visiting ladies, including a luncheon and style show, a trip to Central City and the historic Opera House, and a trip to the Air Force Academy at Colorado Springs.

You can have this . . .



especially for owners of original AGI Glossary, First Edition, 1957

or this . . .



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1957 Edition
J. V. Howell, Editor
with
Keys to supplement
* terms redefined
⟶ new terms

g, continuous profiling.

h profile.

he line along which a given vertical plane in
vertical section of the water table. (After
p. 33, 1923)

e). 1. "There is a profile of equilibrium which
ly impart, if allowed to carry its work to com-
hange of shore line and the supply of new drift
ions with which no fixed form can be in equilib
/ever, certain adjustments of current slope, and
ttained, are maintained with some constancy.
these adjustments is commonly known as the pro-
(Fenneman, N. M., Jour. Geol., vol. 10, p. 1,
"A (shore) profile on which the incoming and out-
and sand is balanced." (Goldthwait, J. W., Ill.
o. 32-33, 1908) 3. A marine platform consisting
which extends to shore and a built platform far-
e has become smooth and nearly uniform. At
re is a balance between erosion and deposi-
d a Graded profile or Profile of equilibrium,
steepest near the shore. (Cotton, C. A.,
aland, p. 383, 1926) 4. "A profile of equilib-
, is a river profile in which the slope at every
to enable the stream to carry its load of sedi-
ng sediment nor eroding the river bed." (Rice,
G., Bull. 41, State Geol. and Nat. Hist. Surv.,

am showing the shape of a surface as it would
ion. The placement of the profile section is
wn on an accompanying map. (Lahee, F. H.,
, 1931)

osits made beyond the limits of the glacier."

s of glacial origin beyond the limits of the gla-
ims, --- deposits, --- loess.

dvance of the shoreline resulting from the
sediments brought to the sea by rivers.
hology, p. 431, 1945)

nore line that is advancing seaward. See
ry, W. D., Prin. of Geomorph., p. 443,

volution from simple toward more complex and
l structure. (Fuller and Tippo, p. 969, 1949)

e Overlap.

Large irregularly shaped ripple marks formed
gh velocity above the third critical point. Move-
d waves is in the down-current direction.
l. of Sed., pp. 571-2, 1950)

which is manifested by the progressive move-
BEB2)

h bold termination, a headland. (Topog.)

ocal in southern Appalachian Mountains.

ansmission of waves through water. (BEB2)

ion of the paraffin series, formula C_3H_8.

a system are its characteristics which
xperiments. (API, 1941)

a material is capable of
nality of stress to
rm and elastic limit
g duration they
low the short-time

or sericite may also be formed. Most characteristic of the hydrothermally altered, fine-grained, intermediate rocks, such as andesites.

pect. 1. The name given to any mine workings the value of which has not yet been made manifest. (Ihlseng) 2. To examine land for the possible occurrence of coal or valuable minerals by drilling holes, ditching or other work. (Steel) 3. In geophysics, an area being examined or to be examined by geophysical methods. 4. A geologic or geophysical anomaly, especially one recommended for additional exploratory work.

Prospect hole. Any shaft, pit, drift, or drill hole made for the purpose of prospecting the mineral-bearing ground.

Prospecting. 1. Searching for new deposits; also, preliminary explorations to test the value of lodes or placers already known to exist. 2. The examination or exploration of an area by means of geophysical instruments or methods. E.
or gravimeter, magnetic
Seismic prospecting us
electrical prospecting m
tivity, or electromagnet

Prospector. A person eng
testing supposed discov

Protalus rampart. A ridge of blocks that accumulates by sliding or rolling down over semipermanent snowbanks. They occur most commonly in cirques. (Bryan, 1934) See Winter-talus ridge.

Protaxis. In geology, the oldest of the mountain ranges in a mountain chain. (Standard) Now obsolete.

Protective colloid. A colloid which, when present in small quantities, is capable of preventing or retarding the coagulation of another colloid.

Proteolite. A general term for hornfelsic rocks introduced by Boase 1832, and used by Bonney, 1886, for andalusite-hornfels. See: Cornubianite, Hornfels, Leptynolite.

* Proterogenesis. Appearance in embryonic stage of features typical of fully developed adults among descendants, thus foreshadowing evolutionary trends; commonly associated with abrupt evolutionary branching out of embryonic or early juvenile stage of another organic stock. (After Moore, Lalicker and Fischer, p. 142,

* Proterozoic. Term used by some geologists to cover all Precambrian time and by others to cover only the younger part of the Precambrian. As more physical measurements are made of geologic time, the usage is changing. The Am. Comm. on Strat. Nomenclature now recommends substitution of the terms Late Precambrian and Early Precambrian

Prothallus. [illegible] gametophyte stage or gametophyte [illegible], a cellular and usually [illegible] structure on the ground, bearing the sexual organs, as antherida and archegonia. (Lawrence, p. 767, 1951)

* Protista. A taxonomic division proposed by Haeckel to include all one-celled organisms, whether animal or plant. (After Moore, Lalicker and Fischer, p. 39, 1952) Term proposed by Haeckel.

Protoclase. A rock possessing cleavage originally developed during sedimentation under water or cooling from magma, such as bedding, flow structure, etc. Compare Metaclase. (U. S. Geol. Surv., Bull. 239, p. 12)

Protoclastic. A term applied to a structure of igneous rocks in which the constituent minerals show granulation and deformation, produced by differential flow of the magma before complete consolidation.

Protoclastic gneiss. A rock in which gneissose structure was produced by differential flow of partly consolidated magma. (Originated by Brögger, 1890) See: Augen gneiss, Autoclastic schist, Gneiss, Granite gneiss, Orthogneiss.

Protoconch. In a gastropod: 1. Equivalent to nucleus. 2. Restricted to simple cap-shaped plate that constitutes the first shell rudiment. (Shrock and Twenhofel, p. 408, 1953)

Protogenes. The first type of living creature. (Merriam-Webster, 1951)

Protogenic. Of, or pertaining to the older crystalline rocks, believed to have been formed by igneous activity.

Protogene.

plied to alpine gneissose granites which are con-
toclastic or composite in origin. (Originated
'mes' Nomenclature of Petrology, p. 190,

ish breccia made of megascopically
nly lenticular in shape and which pre-
stratification, schistosity) of the
or arkose on weathered sur-
escopic gliding surfaces . . .
rse brecciation, pointing
, and implying in the
rocks of which mylo-

Supplement carries new terms

Original 1957 Edition with keys added
→ new terms
* redefined terms

· crystal goniometer in which individual
ttice are X-rayed without distortion.

providing evidence regarding deposi-
evealed by sedimentary textures and
A. P. G. 42, 2725.

n echo sounder having an accuracy better
al, 1959, G. S. A. Spec. P. 65.

Pressure exerted on unconsolidated sedi-
ial that resulted in compaction; the over-
moved later by erosion.

Nonruptural deformation in a tectonite
ntinued after deformation ceases; Knopf.

on an unconsolidated sedimentary su
turbidity current; Kuenen 1957, J. G.

e when the surface of the earth became
it is today, certainly 3 and perhaps 4.5

sed; said of a taxonomic name. The law
nit the reuse of a preoccupied name.

om a time preceding the formation of
ce; early

* Terms redefined in Supplement

in con-
of inter-

older than a particular period of fold-
lated to orogeny or much older; Billings,

. Recrystallization in a tectonite that
n was completed; Knopf. *

sland arc convex outward from a conti-
seated structure such as a great shear
of an inner volcanic arc and an outer
either by distorted sediments or an

hin an igneous rock which is partly
n. 18, 33.

ivided geosyncline; Haug; Glaessner

ee fabric was determined by move-
k developed; Knopf 1938, G. S. A.

the

area during a unit of time.

proglacial lake. Lake occupying a basin in front of a glacier generally in direct contact with the ice. Varves commonly formed in such lakes.

programme evolution. Parallel evolution in lineages with a common ancestry; Simpson 1953, Maj. Feat. Ev. 246.

projection. A diagram or representation of three dimensional space relations produced by passing lines from various points to their intersection with a plane.

projection net. Network of meridians and parallels used for plotting and measuring spherical projections; Knopf 1938, G. S. A. Mem. 6, 66.

proration. 1. Proportionate distribution. 2. Legal restriction of oil production to some specified fraction of potential production.

prostratigraphy. Physical stratigraphy; a preliminary step in the determination of the chronologic relations of rocks; Schindewolf 1957, A. J. S.

proterogenesis = neoteny; Schindewolf 1950. *

proterotype. = primary type; Frizzell 1933, Am. Mid. Nat. 14.

Proterozoic. 1. Younger of two Precambrian systems or eras; = Algonkian. 2. The entire Precambrian; this is the sense recognized by the U. S. Geological Survey. *

protist. 1. A multicellular organism. 2. A single-celled organism.

Protista. Kingdom of one-celled organisms. *

protobitumen. Unaltered or little altered organic material, e. f. fats, oils, waxes, resins, from which bitumens are derived; Potonie 1950; Tomkeieff 1954, 77.

Protochordata. Phylum or subphylum of animals that possess a notochord during some part of their life histories but do not have a bony skeleton or spinal column. They occupy a position intermediate between the invertebrates and vertebrates; included by some in the Chordata.

protochordate. Member of the Protochordata.

protoclastic deformation. Reorientation of crystals in an igneous rock before the inception of shearing or gliding; Balk.

proto-dolomite. Crystalline calcium-magnesium carbonate in which the metallic ions occur in the same crystallographic layers instead of in alternate layers as in dolomite; Goldsmith and Graf 1957, G. S. A. 68, 1735.

Protophyta. Single-celled plants.

protophyte. Member of the Protophyta.

protoplastotype. Cast of a primary type; Frizzell 1933, Am. Mid. Nat. 14.

protoquartzite. Sandstone intermediate between orthoquartzite and subgraywacke; Potter, A. A. P. G. 41, 2696.

protoscience. Philosophic speculation concerning nature before beginning of scientific era.

Prototheria. Subclass of mammals, includes spiny anteater and duck-billed platypus; Pleis.-Rec.

(add) 2. Most primitive form in a group of related organ-
3. = holotype. Frizzell 1933. *

of single-celled animals, includes the Flagellata,
na, classes that are represented by fossils.
to be a division of the protistan kingdom. *

zoea.

enting a fragmentary holotype;

in some way and considered

lar geographic or

d only locally;

New Supplement
4300 terms

GLOSSARY of GEOLOGY
and Related Sciences WITH SUPPLEMENT

Supplement prepared by

AGI GLOSSARY REVIEW COMMITTEE

J. Marvin Weller, *Chairman*

PART I: Original Glossary of Geology (about 14,000 terms, J. V. Howell, editor, 1957) with special marginal keys which indicate redefined terms and new terms listed in the accompanying Supplement (Part II).

PART II: Supplement of nearly 4,300 new and redefined terms, prepared by the AGI Glossary Review Committee.

Cloth bound, 395 pages

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USGS REPORTS ON 1960 RESEARCH

Under the title *Geological Survey Research 1960,* the U. S. Geological Survey has just published a report that it regards as an experiment in the prompt release of its findings. The report, Professional Paper 400, is divided into two main parts. Chapter A is mainly a narrative "*Synopsis of geologic results*" obtained in fiscal year 1960, but it includes lists of all Geologic Division offices, titles of investigations in progress, and a bibliography of all reports released during the year. Chapter B, called "*Short papers in the Geological Sciences,*" consists of 232 scientific papers. Some of these are scientific notes on topics of limited scope, analogous to notes published in the technical journals; most are cream-skimming, preliminary summaries of important results obtained in more comprehensive studies, the full results of which will be published later.

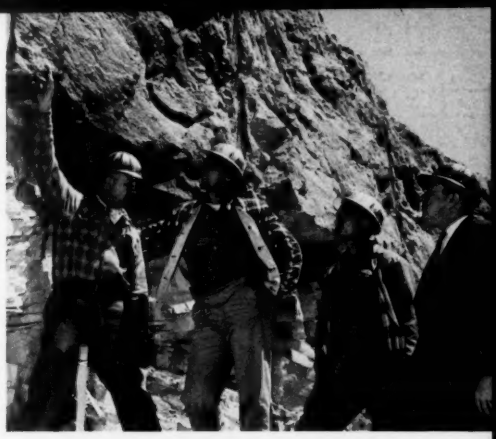
We think the geologic profession and the interested public will find much of value in both chapters, for both release much new economic and scientific information over almost the full range of the geological sciences. Because Chapter B is 515 pages in length, no one will likely read it in toto, but the papers are arranged and indexed so as to make it easy to find those dealing with a particular subject. The text of Chapter A, about 70 pages in length, is short enough to be read in full by many people, and it may serve not only to call attention to important new findings in specific fields but also to help the specialist keep abreast of new developments in other fields besides his own.

Tentatively the Survey plans to publish a similar volume annually, but this will depend on how well the present volume achieves its purpose. Professional Paper 400 covers only the work of the Geologic Division, but if the project is continued it will likely be expanded to include the work of other divisions as well.

The report will be distributed by the Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C. The price is to be announced.

"The engineer must become a bedfellow with the scientist. The scientist builds new knowledge; the engineer builds a new chain of products using that knowledge."

EUGENE McDERMOTT
at Stevens Tech commencement June 11, 1960.



SANTA FE has encountered some very interesting geology in cuts along its new 44-mile line change project near Williams in Northern Arizona. In the photo above Santa Fe engineer Roy A. Stane (left) points out evidence of active displacement between the massive beds at the top of the photo and the thin bedded, light-colored rocks below as two Bradley University engineering students and Santa Fe's President Ernest Marsh (right) look on. The new exposures resulting from the relocation provide new opportunities to study the Tertiary volcanism of the area. It is possible to arrange for geological societies and groups of geologists to obtain permission for field excursions along the new line by contacting R. H. Beeder, Chief Engineer of the Atchison, Topeka and Santa Fe Railway System.

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ANTARCTIC RESEARCH

The National Science Foundation recently announced 45 grants and one contract totaling $3,175,000 to aid in scientific research projects in the Antarctic. Among these are two of particular geological significance.

The University of Wisconsin has received a $41,639 grant for a study of patterned ground, found on most ice-free land areas of the continent. These formations usually appear as polygons associated with sand and ice wedges. The investigators hope to find out what causes them, how they develop, and whether they may serve to aid in dating geological events in the region. Fossil wedges reported in North America have enabled other scientists to infer past climatic changes.

Another significant geology project will be a continuation of the rock thermoluminescence studies of Dr. Edward J. Zeller of the University of Kansas, for which NSF has granted an additional $31,955. Studies of this phenomenon can provide information of the temperatures at which rocks and minerals have existed, and provide clues to the geologic history of the area.

Among the participants in the U. S. program in the Antarctica are several foreign geoscientists:

George Doumani of Lebanon, now employed by Ohio State University, will be a geologist with a scientific party on the Horlick Mountains. Doumani was on the 1959-60 Byrd traverse and wintered over at Byrd Station in 1959. Mario Giovinetto of Argentina, a glaciologist, will accompany the Crary traverse. Giovinetto has wintered over at Pole and Byrd Stations, and has spent several seasons at Argentine antarctic stations. Charles W. M. Swithinbank of the United Kingdom, a glaciologist, will be party leader of a group working on the Ross Ice Shelf. Swithinbank was a member of the 1949-1952 British-Norwegian-Swedish expedition to Queen Maud Land.

You saw it in GeoTimes . . .

MOBILE UNDERWATER VEHICLE (MUV) is a rig for surveying the ocean bottom to depths of 600 feet by television camera. Driven and guided by three electric propulsion motors controlled aboard ship at the surface, it may be adapted for bottom sampling and coring. For more information write *VARE Industries, 128 West First Ave., Roselle, New Jersey.*

MANPOWER *in a column —*

By HOWARD A. MEYERHOFF
Scientific Manpower Commission
1507 M Street, N.W., Washington 5, D. C.

The earth science professions were caught flat-footed when domestic and foreign exploration for oil and metals was abruptly curtailed. Up to that time practically anyone who could tell a claw hammer from a shale pick and spell the word paleontology was assured of a job. In the cutbacks the good were too often sacrificed with the bad—and the older men with the younger.

Professional societies were slow to lend a hand to their jobless members, and some haven't acted at all. Those that have, have started with bucket brigades, whereas modern, streamlined fire apparatus is needed. Co-operation from industrial employers has proved hard to get—partly because exploration departments must be guided by managements that are seeking sales, not more raw material.

Recently a political solution to the unemployment situation has been proposed. It is being urged that Congress give a special appropriation, or a larger regular appropriation, to the U. S. Geological Survey, to enable it to undertake new short-term work, or to resume work on "recessed" projects.

Whether the 86th Congress was influenced by this legislative proposal is unknown, but it did pass a supplementary appropriation of $300,000 so that the Survey might start a ten-year comprehensive project in collaboration with the state of Kentucky. Matching funds will be provided by the state. Initially, the project will employ 60 people. Next year, when state and federal funds will be doubled, 75 or more will be engaged in this activity.

Kentucky did not enter this joint study with the idea of employing jobless geologists, but no better time could have been chosen from the standpoint of available personnel. There are 49 other states. Some of them need geological therapy worse than Kentucky.

Aren't the state capitals better places to arouse interest than the District of Columbia? Congress cannot lightly pass legislation to employ jobless geologists without considering bills for displaced coal miners or unemployed elevator operators. The states, on the other hand, can lobby at the nation's capital more effectively for detailed areal studies that will not only benefit them but also be in the national interest.

GEOTIMES

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FAULT SYMBOLS

by Mason L. Hill

INTRODUCTION: The following fault symbols are designed to remove the ambiguity resulting from failure of traditional symbols to distinguish between fault slip and fault separation. Where a linear geologic element is displaced the actual relative movement (slip) can be determined (e.g., displaced intersection of dike and bed). Generally, however, where a tabular geologic element is displaced only apparent relative movement (separation) can be determined. Thus, for example, these symbols provide for the important distinction between normal fault (only separation known) and normal slip fault (slip known). Refer to "Dual Classification of Faults," Mason L. Hill (1959), A.A.P.G. Bull., v. 43, p. 217-21.

General Symbols

Fault trace, for maps and sections.

Approximately located trace, for maps and sections.

Conjectural trace, for maps and sections.

Concealed map trace; Conjectural (. . ? . .).

Dip direction; Amount (60), approximate amount (25±), conjectural direction (?).

Relative slip direction; Conjectural (?); Slip plunge ( ), approximate plunge (25±).

Note: Fault trace may be distinguished from other geologic contacts by weight or color of line, or by labeling with name or symbol, as desired. Slip plunge is vertical angle measured downward from horizontal to net slip.

Slip Symbols for Maps

(Add direction and amount of dip, direction of relative slip, and slip plunge, if and where known.)

Thrust slip fault. Triangles on relatively overthrust block; Fault dips $< 45^{\circ}$

Reverse slip fault. Rectangles on relatively elevated hanging wall block; Fault dips $> 45^{\circ}$ Dip direction is shown here.

Normal slip fault. Barbs on relatively depressed hanging wall block; Fault dip and direction of relative slip are shown here.

Right-lateral slip fault. Arrows shown sidewise relative movement of block opposite the observer.

Left-lateral slip fault. Fault dip and slip plunge are shown here. If dip-slip and strike-slip components were nearly equal, the name reverse left-lateral slip fault would be appropriate.

Note: Triangles, rectangles, and barbs may be shown as appropriate and convenient along the map trace of the fault. However, none of these symbols should be used on maps unless some evidence of at least the approximate orientation of slip is obtained.

DATA SHEET 20

AGI Data Sheet 20 Fault Symbols by Mason L. Hill is another important contribution to this helpful series of data sheets which have become an important feature of GeoTimes. This data sheet is basically compatible with AGI Data Sheets 1-3, Geologic Map Symbols.

The data sheet series is prepared under the guidance of the AGI Data Sheet Committee, the members of which are listed here:

John E. Allen
William Beatty
Chester Longwell
Vincent McKelvey
George Thompson
Ian Campbell
Richard M. Foose, *Chairman*

Persons interested in working with the Committee on the development of new data sheets should contact *Dr. Richard M. Foose, Chairman, Earth Science Division, Stanford Research Institute, Menlo Park, California.*

Slip Symbols for Sections

Thrust slip fault. Arrow shows principal relative movement component; Fault dips $< 45^{\circ}$.

Reverse slip fault. Fault dips $> 45^{\circ}$.

Normal slip fault.

Right-lateral slip fault. Principal relative movement component of block toward observer is shown by the letter T.

Left-lateral slip fault. Letter A (away) and arrow (downward) show relative movement components. If these components are nearly equal, the name normal left-lateral slip fault is used.

Note: Single barb arrows and letters (T and A) may be shown on either side of the section trace of the fault, as appropriate and convenient. However, none of these symbols should be used on sections if only separation is determined.

Separation Symbols for Maps

(Add direction and amount of dip, if and where known.)

Dip separation-apparent relative movement in fault dip; D-downthrown or U-upthrown. Normal fault has dip toward downthrown block; Reverse fault has $> 45^{\circ}$ dip toward upthrown block (illustrated); Thrust fault has $< 45^{\circ}$ dip toward overthrown block.

Strike separation - apparent relative movement in fault strike of block opposite the observer. Right-lateral fault, R; Left-lateral fault, L.

Dip and strike separations nearly equal. A normal left-lateral fault is illustrated.

Note: Letters indicating separation may be shown as appropriate and convenient on either side of the fault trace. The symbols (+) and (-) may be substituted for U and D but none represents any component of slip. Separation symbols are not needed for sections, and are only occasionally necessary for maps because the displacement of tabular geologic elements is usually obvious.

REMARKS: The essential function of these proposed fault symbols is to let geologists clearly indicate where information on fault slip has been determined, and not allow them to indicate slip where only separation is known. As customary, only those symbols which are used on a particular geologic illustration need be shown in the legend.

MEMBER SOCIETIES
of the
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June 1960 Edition

A 16 page booklet which gives data on the organizations, history, purpose, membership requirements, publications, and other pertinent information on the fourteen Member Societies of the American Geological Institute.

Lists present officers of all Societies.

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AGI LIST OF PUBLICATIONS

AGI has recently published a new list of publications, listing the various journals and other publications published by AGI.

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Elias Receives Grant

M. K. Elias has recently been awarded an NSF grant to study "Carboniferous Bryozoa of America and Europe." As a part of his study, Dr. Elias will visit localities in various European countries, including Russia, during 1961. His research will be done at the Research Institute, University of Oklahoma.

Smith Fund Established

Alumni and friends of the Department of Geology, Union College, Schenectady, New York, have established the Edward S. C. Smith Prize Fund in Geology, in honor of Professor Smith who has just retired as Chairman of the Department after serving thirty-seven years on the faculty at Union. The prize, which will amount to about one hundred dollars annually will be awarded to a top-ranking senior major in geology.

OPPORTUNITIES FOR SOVIET STUDY

The Inter-University Committee on Travel Grants, representing a number of American universities, is soliciting applications and inquiries from qualified persons concerning the fourth year of long-term exchange of advanced graduate students and young scholars with the Soviet Union (1961-1962).

During the academic year 1959-60, two American graduate students in geology studied at the Moscow State University under auspices of this program. They were John B. Adams of the University of Washington and Paul C. Randan of the State University of Iowa. This inter-university project was formerly administered by Columbia University.

To be eligible an applicant must be (1) an American citizen; (2) not over 40 years of age; and (3) a graduate student enrolled at the time of application for an advanced degree, or a postdoctoral researcher, or a young university faculty member. Applicants in the Russian studies field must be proficient in Russian at the time of application; applicants in other fields, if they are not proficient in Russian, must be willing to undertake intensive summer study in order to attain proficiency. Applicants from all fields of study will be considered, although the applicant must be able to demonstrate that there is reasonable professional benefit to be derived from his proposed study in the Soviet Union.

The period of time provided for study in the Soviet Union in this exchange program has been the full academic year. Shorter or longer periods of study, from five to fifteen months, can probably be arranged. In almost all cases, Soviet authorities allow couples without children to go to the Soviet Union together for the full academic year. Soviet authorities do not allow American participants in this program to bring their children, but one visit between husband and wife during the academic year has generally been allowed.

Financial aid is available to cover all or part of the participant's expenses. The amount of aid will be determined by the applicant's own financial situation. Fellowships from other sources can be applied toward participation in this program.

Applications for the 1961-1962 program must be submitted on or before January 5, 1961. Further information and application forms may be obtained from *Inter-University Committee on Travel Grants, Box 70, Indiana University, Bloomington, Indiana.*

ST. LOUIS UNIVERSITY EXPANDS SEISMOGRAPH NETWORK

Four new seismograph stations will be established in the Midwest by St. Louis University under contracts awarded by the Advanced Research Projects Agency (ARPA) of the Department of Defense in connection with the seismic research and development program VELA. The stations are to be located in Kansas, Iowa, Ohio and Missouri, but the actual site selection will be predicated on geologic studies. The contract provides $215,000 for construction and equipping of the stations and for the analysis of data.

The stations will concentrate on the study of long-period seismic surface waves generated by earthquakes and the mechanical characteristics of the point of origin of earthquake waves.

St. Louis University, which already operates seismograph stations, began its seismological research early in the 1900's and was a member of the first Jesuit seismographic network established in 1910 by 15 Jesuit colleges and universities.

The VELVA program (GEOTIMES, *Sept. 1960, p. 22*) is designed to increase understanding of the complex technical problems associated with a moratorium on nuclear tests. In fiscal year 60 approximately $10 million was provided for the early stages of the program. It is anticipated that $66 million will be required for all aspects of the seismic research and development program. The program, with its far-reaching implications, should afford great opportunity for advancement of geologic knowledge through research advances in all aspects of the geosciences bearing directly or indirectly on seismic phenomena.

Funds available to VELA for research are not entirely committed to specific projects, so that there are opportunities to seek support for research which will contribute to the body of knowledge being sought. For information on how proposals are to be prepared and submitted write *Advanced Research Projects Agency, Washington 25, D. C.*

GEOTIMES CALENDAR

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The publication of this cover-to-cover translation by the American Geological Institute became available in April 1960. The earth sciences sections include:

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GEOLOGY in the Public Eye

by
Robert L. Bates
Department of Geology, Ohio State University

Visitors to Yellowstone may now buy a booklet by W. A. Fischer, park geologist, which describes last year's earthquake and interprets the seismic history of the park area. Liberally illustrated, and containing two maps, *"Yellowstone's Living Geology"* is a timely summary for layman and geologist. . . . John Schilling sends a copy of *"Nevada Highways and Parks"* magazine, with an article by Conrad Martin on the volcanic area crossed by U. S. highway 6 between Tonopah and Ely. Large color photos of Lunar Crater and vicinity are used to advantage. . . . On August 1, the *Wall Street Journal* devoted no less than 38 column-inches to *"Booming Beryllium."* Main subjects were the discovery of a new kind of Be ore at Topaz Mountain, Utah; the squabble between two companies for mineral rights; and the effect that the new find may have on the current beryllium-from-beryl picture. Norman Williams, geologist of Beryllium Resources Inc., is quoted. The article, which was sent to us by Stuart Maher, is an excellent example of authoritative, clear reporting. . . . Your correspondent, though no philatelist he, has squandered 90 cents for a set of 5 of those Swiss stamps showing minerals and fossils. They're in color, and beautiful. . . . John Allen of Portland State College participated in a conference on science news writing in June at the University of Oregon. . . . The Maine Geological Survey, with the State Park Commission, has issued the first two of a new series of booklets for tourists and campers. *"The Geology of Sebago Lake State Park"* by A. L. Bloom, and *"The Geology of Baxter State Park and Mt. Katahdin"* by D. W. Caldwell, are well illustrated and should clarify the glacial and bedrock story for the layman. . . . Even the paleobotanists are getting into the act. The Illinois Survey has published a popular booklet, *"Pennsylvanian Plant Fossils of Illinois,"* by Collinson and Skartvedt. It is a well-illustrated fieldbook for beginners in collecting and classifying plant fossils. The famous Mazon Creek locality gets deserved attention. . . . Altogether, not a bad season for public-eye geology, wouldn't you say?

Table 2. Lunar experiments manned.
(listed in order of importance)

EXPERIMENT	PURPOSE	TIME
1. Geological Reconnaissance	Mineralogy, petrology, geomorphology, trafficability - all possible observational information on the lunar surface	First man on moon, 1965, will conduct some reconnaissance from landing vehicle. Main effort to begin 1967
2. Radiation	Study all types of electromagnetic and corpuscular radiation to determine its effect on the lunar environment and biological organisms	Continuing
3. Biological	Test the psychological and physiological effects	First man on moon, 1965 - continuing
4. Virology	Test the moon for dangerous organisms	First man on moon, 1965 - continuing until determined
5. Electric Survey	Locate hidden fissures and structures dangerous to surface transportation, resistivity and conductivity	Intermittent depending on value of data
6. Seismic	Determine depth of surface rocks and seismicity	Continuing
7. Gravity	Locate structures	Intermittent
8. Magnetic	Absolute magnetic intensity/anomalous structures	Intermittent depending on application
9. Meteor Particles	Size and frequency of meteorites	Continuing
10. Temperature	Temperature profile and its change with time	Intermittent after 1967
11. Core Sample	Study on earth of moon rocks	First landing party

LUNAR EXPLORATION

(Continued from page 8)

Surface radioactivity will be determined for different rock types and structural features around the landing site. On earth, radioactive elements are commonly confined to SIALIC and sedimentary type rocks. If differentiation or fractioning has occurred in lunar melts or lava, concentrations of radioactive minerals are possible. In the absence of weathering and erosion agents, magmatic differentiation and subsequent injection will probably be the main process for concentrating minerals and forming economic mineral resources.

Other studies will include a determination of the electrostatic field of the moon near its surface and its potential gradient, very precise mass-spectographic measurements of the constituents of the atmosphere, measurement of any atmosphere circulation, and meteor frequency and size.

The landing party will have about twelve days of continuous sunlight in which to conduct their investigations. For about five days of this time the lunar surface will be illuminated by rather direct sunlight, and for the remaining days long shadows will prevail. The sun will appear to move across the sky about 13 degrees of arc per terrestrial day.

The results of the scientific observations by the first landing party will form the basis for the procedures and objectives for establishing a permanent lunar base. This permanent facility will mark the beginning of the third and final step of lunar exploration, and it will be characterized by "men on the moon"—they will live there, grow their food there, use indigenous materials for construction, build research facilities, and use the advantages of the moon's environment and celestial position to explore the solar system.

Photogeology of the Moon

The Department of the Army recently published a report, *"Engineer Special Study of the Surface of the Moon"* which was prepared in cooperation with the U. S. Geological Survey. The purpose of the study was to provide information to be used in selecting a landing site and to aid in design and instrumentation problems relating to lunar exploration.

The report consists of three maps (scale 1:3,800,000) and the text. There is a photogeologic map, a map of physiographic divisions and one showing lunar rays.

A limited number of these reports are available for distribution to persons interested in lunar problems and may be requested by writing to *Office of the Chief Engineer, Department of the Army, Washington 25, D. C.*

DEAR EDITOR:

Can you tell me where I can get a copy of the report of the U. S. G. S. made for the U. S. Army Engineers on the subject of the moon? I am very much interested in selenology. Recent writers in GEOTIMES have made no mention of J. E. Spurr's four books on the moon published in 1944-1949, the last a year before his death. With all due regard for differences of opinion Spurr should have full credit for his pioneering efforts. He has sketched many geological features and has attempted relative age classifications. He is a strong advocate of non-meteoritic impact for the lunavoes although he doesn't rule out some impacts as probable.

Whatever his views I hope he is given the credit due his efforts as he is undoubtedly the first geologist to make an intensive study of the moon. Gilbert also made a study, but not as complete a one as Spurr.

Cordially,

DORSEY HAGER

DEAR SANDSTONE SAM:

When petroleum geologists from Midland, Texas and Saudi Arabia romp on the glaciers of Norway, when hard rock petrologists stand facing the salt spray of a fjord, I am certain that geology was meant to be fun. It is summer in Scandinavia and the Viking spirit is in all of us and most are steeped in Viking spirits. The ladies are on a shopping spree buying sweaters and dolls. The menfolk, who have eyed all the dolls, are content to bring back more esoteric things like eclogite, carbonatite, or a pocket sized anticline.

When we do return as we all hope to and at coffee breaks describe our trials and difficulties, just remember this—we are all having one h--- of a good time.

In all veracity,

B. W. BROWN
from Copenhagen, Aug. 1960

Editor's Note: And about 4000 others.

DEAR SIR:

This geologist is in search of a map symbol for an epoch, the Paleocene.

The U.S.G.S. is usually sufficient authority for matters of this kind, but that body no longer indicates epochs on maps by lower-case letter in the symbol. The research geologist and the explorationist cannot afford this luxury. Many of his units are of necessity represented by age rather than by formation.

The difficulty about a Paleocene map symbol is of course to avoid confusion with the Pliocene. Some authors use Tp or Tp .

This is satisfactory as far as symbol practice goes, and satisfactory as far as convenience goes. But for my part I am not happy about this usage for two reasons: (1) the modification of the lower-case "p" can pass unnoticed, especially on photostat or other reduction, (2) the Paleocene, by its very name, is Eocene more than it is anything else—some reputable authors still show it as an Eocene sub-division—so that there should be an indication of Eocene in the symbol.

Accepting the Paleocene as a full epoch it might be possible to write pTe (Tertiary, pre-Eocene). An alternative is perhaps Tep or even ep . The last has a slightly alchemical appearance, but this need not be an objection. Readers are invited to communicate their comments.

Yours sincerely,

MAURICE KAMEN-KAYE
630 Fifth Ave.
New York 20, N.Y.

USBM-Nevada Cooperation

The Nevada Bureau of Mines recently entered a cooperative agreement with the United States Bureau of Mines for the exploration and evaluation of industrial minerals in Nevada.

The Nevada Bureau of Mines will be responsible for reconnaissance field work and sampling whereas the U. S. Bureau of Mines will carry out laboratory testing of materials submitted. Under the agreement, residents of Nevada may submit samples for preliminary testing providing they are accompanied by accurate descriptions of the location, extent and ownership of the deposits.

Popular Geology in print

by Mark W. Pangborn, Jr.

In CRYSTAL & MINERAL COLLECTING (Lane Book Co., 1960, $3.50), *William B. Sanborn* shows the beginner how to collect intelligently. Included are a list of mineralogical museums, abundant photos, an inadequate bibliography, and chapters on the properties of minerals, collecting environments, tools and techniques, specimen sizes and types, and the housing, cataloging, labeling and valuation of specimens.

Ninety fine large photographs, thirty of them in magnificently registered color, are the main feature of *H. W. Ball's* MINERALS AND ROCKS (Hanover House, 1959, $4.95); a concise text of generalities about the mineral kingdom completes this "armchair" type book. Another armchair title, for ages 8 to 11, is Anne Terry White's ROCKS ALL AROUND US (Random House, 1959, $1.95), which describes the nature and origins of the commoner rocks; unfortunately, the handsome illustrations are not as informative as the text, a weakness of most Random House juveniles.

When THE EARTH FOR SAM, by *W. Maxwell Reed*, appeared in 1930 it quickly established itself as a best seller—against little competition until the Fentons' books began to appear—selling 50,000 copies by 1957. This history of the earth and its life, for ages 12 to 16, with many new pictures and the flavorsome text slightly revised by *Paul F. Brandwein* (Harcourt Brace, 2d ed., 1960, $4.95), will undoubtedly continue to sell well until a better treatment for this age level is provided.

The Boy Scout-junior high crowd will enjoy *Vanya Oakes'* novel ISLAND OF FLAME (John Day Co., 1960, $3.50), in which young Chet Meredith learns geophysics as he helps his geologist uncle set up the Hawaiian Volcano Laboratory in 1912. For the same age group and also cast in fictional form is *Julian May's* less convincing THERE'S ADVENTURE IN GEOLOGY (Hawthorne Books, 1959, $2.95), in which young Randy and Sam Morrow travel around the country with their science-writer father, visiting spots like the Grand Canyon, Meteor Crater, and the Keweenaw Peninsula. The boys are exposed to geological facts—and other hazards—at every turn; well illustrated; no bibliography, though a guide to the easy literature would be useful here.

After many years available again in cheap reprint, and guaranteed to thrill any teenage boy and most adults is *Arthur Conan Doyle's* vivid novel about dinosaurs in the Brazilian back country, THE LOST WORLD (Pyramid Books, 1960, $.35); a more expensive edition (Random House, 1959, $1.50) features frightful illustrations that only serve to break the book's spell.

Surely the most attractive dinosaur book yet published is THE GIANT GOLDEN BOOK OF DINOSAURS AND OTHER PREHISTORIC REPTILES, by *Jane Werner Watson* (Golden Press, 1960, $2.95); written for children 8 to 12, it describes the dinosaurs, their ancestors, and their Mesozoic kinfolk period by period, with a concluding section on dinosaur collecting and exhibiting; the text is generally good, and the abundant large pictures, *all* in color, are beautiful and informative.

REEF RESEARCH AT UNIVERSITY OF ILLINOIS

The Petroleum Research Fund of the American Chemical Society recently made a three-year grant in the amount of $21,000 to the University of Illinois, Urbana, for petrographic research on Silurian reefs. Dr. Albert V. Carozzi, Professor of Geology, will be in charge of the study. He and his associates will make detailed microfacies investigations of reef, fore-reef and inter-reef deposits in the Silurian belt which extends through Ohio, Indiana, Illinois, Wisconsin, and Iowa. It is expected that the results of these studies will contribute significantly to the understanding of ancient reef environments.

LEHIGH UNDERTAKES BI-SE-S RESEARCH

Lehigh University has been awarded a grant of $8,975 by the Research Corporation of New York for research on the lead-bismuth-selenium-sulfur system. The objectives of the program cited by Dr. H. Richard Gault, Chairman of the Geology Department, who will direct the research, will be "to determine the phase relations in the system and then apply this information to naturally occurring mineral systems important to the economic geologist's understanding of the origin and occurrence of ore deposits." This particular system includes galena, the important ore mineral of lead.

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THE UNDERGROUND STORY OF NATURAL GAS. 16 mm. Sound. Color. 27 minutes. 1956. This is one of the best available films for telling the story of natural gas from reservoir to consumer. It begins by describing briefly the formation of gas in the earth as much as several hundred million years ago, and its subsequent concentration in natural reservoirs (here a short sequence on faulting and mountain building is the only unrealistic part of the film). Man, through use, depletes the original gas supply, and storage of reserves for peak periods of consumption becomes important. Technicians run electric and gamma ray logs to pinpoint the depths to suitable storage horizons in old fields, geologists and reservoir engineers examine rock samples and data from former producing wells and decide that recharge and storage of gas is practical, drilling crews set new casing, and pipeline men install pipelines and pumping units, all to provide gas when and where needed, and in adequate amounts. Suitable for high school and college classes in earth science, and in field and petroleum geology. DISTRIBUTOR: *Modern Talking Picture Service, Inc., 21 W. 60th St., New York 23, N. Y. (also in 29 other major cities).*

WHAT'S UNDER THE OCEAN? 16 mm. Sound. Color, or black and white. 1960. Produced in cooperation with the Scripps Institute of Oceanography and the U. S. Navy Electronics Lab, and with Dr. F. P. Shepard as consultant, this film explores both the Atlantic and Pacific Ocean floors, showing some of the ways in which scientists gather information about these relatively inaccessible areas. Swimmers and skin divers explore the more shallow depths; for the deeper areas where pressures are higher, scientists must use such vehicles as the bathyscaph, which has carried oceanographers more than six miles beneath the ocean's surface. Instruments such as the echo sounder reveal the contours of the ocean floor, and the orange-peel bucket gathers samples of bottom sediments, including large manganese nodules. The film is very elementary but suitable for classes in earth science, and as an introduction to a discussion of oceanography. DISTRIBUTOR: *Film Associates of California, 11014 Santa Monica Blvd., Los Angeles 25, Calif.; color, $140, B/W, $70; "preview" copy loaned free.*

SPECIFICATIONS FOR A WORLD-WIDE NETWORK OF STANDARDIZED SEISMOGRAPHS, *8 pp., 1960 National Academy of Sciences–National Research Council, 2101 Constitution Ave., Washington 25, D. C., free on request.*

A first report of the NAS–NRC Committee on Seismological Studies composed of Perry Byerly, Carl Kisslinger, Jack Oliver, Frank Press and James T. Wilson, Chairman.

PHYSICAL GEOGRAPHY, *2nd Edition, by Arthur N. Strahler, 534 pp. 1960, John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., $7.50.*

The original text published in 1951, which has been widely used as a college text in physical geography, is completely revised to incorporate new data and concepts particularly in the area of climatology.

STATICS OF SOIL MEDIA, *by V. V. Sokolovski (2nd Edit., Moscow, 1954) translated to English by D. H. Jones and A. N. Schofield, 237 pp., 1960, Butterworth & Co. (Canada) Ltd., 1367 Danforth Ave., Toronto 6, Ont., $10.50.*

Engineering geologists will appreciate this important reference work on the theory of critical equilibrium in soils.

PHOTOGRAMMETRY AND PHOTO-INTERPRETATION, *by Stephen H. Spurr, 472 pp., 1960, Ronald Press Co., 15 E. 26th St., New York 10, N. Y., $12.00.*

This second edition of *Aerial Photographs in Forestry* has been broadened to treat all aspects of photogrammetry and photo-interpretation. Geologists will profit by the attention devoted to vegetation mapping as well as other helpful data.

OPTICAL CRYSTALLOGRAPHY, *3rd Edition, by Ernest E. Wahlstrom, 356 pp., 1960, John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., $8.50.*

The new edition of this well-known introductory text includes numerous new illustrations and a new chapter on crystal rotation methods as well as numerous revisions.

INTRODUCTION TO SOLIDS, *by Leonid V. Azaroff, 460 pp. 1960, McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y., $9.50.*

An approach to the fundamental understanding of solids with emphasis on the importance of crystal characteristics affecting their nature and properties. Intended for students in various areas of physical science and engineering.

GEOLOGY OF THE INDUSTRIAL ROCKS AND MINERALS, *by Robert L. Bates, 441 pp., 1960, Harper & Brothers, 49 E. 33rd St., New York 16, N. Y., $10.00.*

A growing number of geologists are becoming aware of the challenge presented in the application of geologic knowledge in the exploration and exploitation of the industrial rocks and minerals. The author of this book, in restricting his treatment to geology, has brought together a body of knowledge of these rocks and minerals which will be especially helpful not only to the student, but also to geologists and engineers concerned with this area of economic geology. It is intended that this volume complement – not supplant – the classic reference volumes on industrial minerals which stress the specifications, economic factors, etc.

MICROSCOPIC SEDIMENTARY PETROGRAPHY, *by Albert V. Carozzi, 485 pp., 1960, John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., $11.50.*

A textbook for advanced students of sedimentary rocks emphasizing the microscopic characteristics of clastic rocks, biochemical rocks and chemical rocks. The petrographic descriptions of various idealized sedimentary rock types are developed in a manner uncluttered by geographic descriptions, but there are ample references to literature on specific localities.

GEOLOGIA DE BOLIVIA, *by F. Ahlfeld and L. Branisa, 245 pp., 1960, Instituto Boliviano del Petroleo, Casilla 401, La Paz, Bolivia. U. S. $10.00 (plus postage).*

A new book prepared on the basis of recent investigations and of the literature published during the last 16 years. An abundant paleontological section is enclosed. Stratigraphy, Structural Geology, Magmatism and Historical Geology are treated. A geological map of Bolivia, 1:1.500.00 scale, is included. The book is well-illustrated and includes a very good bibliography.

I.B.P.

THE UNIVERSAL STAGE, *by R. C. Emmons, 305 pp., 1943 reprinted 1959, Memoir 8, Geol. Soc. of America, 419 West 117th St. New York, N. Y. $4.00.*

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ACRONYMS DICTIONARY: *A Guide to alphabetic designations, contractions, etc., 211 pp. 1960, Gale Research Co., Book Tower, Detroit 26, Mich. $10.00.*

Despite the fact that AGI is listed as American Geographical Institute this is a very helpful compilation of acronyms to help those poor lost souls who have difficulty connecting initials with names.

LIST OF PUBLICATIONS, ILLINOIS STATE GEOLOGICAL SURVEY, *46 pp., 1960 free on request, Illinois State Geological Survey, Urbana, Illinois.*

ELEMENTS OF CRYSTALLOGRAPHY & MINERALOGY, *by F. Alton Wade and Richard B. Mattox, 332 pp., 1960, Harper & Brothers, 49 E. 33rd St., New York 16, N. Y. $7.50.*

This is intended as an introductory textbook for the teaching of crystallography and mineralogy. Sound treatment of the elements of crystallography is given and the study of minerals is based on classic concepts of determinative mineralogy.

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CORRECTION

In the July-August issue of GeoTimes, the Pergamon Press ad on page 44 carried a printer's error under Vol. 5 of the Monograph Series which read Clays and Clay Materials. The corrected item appears below:

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Proceedings of the Seventh National Conference on Clays and Clay Minerals. Editor: ADA SWINEFORD, Ph.D., State Geological Survey, University of Kansas.

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PALEOECOLOGIST: To work on carbonate research problems in newly established geological research laboratory. Experience with recent sediments desirable. Ph.D. or equivalent experience. Reply to: Director, Exploration Research Division, Continental Oil Company, Ponca City, Oklahoma.

UNIVERSITY OF OTAGO, Dunedin, New Zealand. Lecturer or Assistant Lecturer in Geology. Applications are invited for the above mentioned position. Salary Range—Lecturer £1,250-£1,700 per annum, Assistant Lecturer, £900-£1,100 per annum. Further particulars are available from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W. C. 1., or from the Registrar, University of Otago, Dunedin, New Zealand. Applications close in New Zealand and London on *November 10, 1960.*

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BOX 611. ASSISTANT PROFESSOR, Ph.D. major university wishes to teach in college or university in more desirable area. 3 yrs. teaching and 6 yrs. varied industrial experience. Primarily interested marine geology, paleontology, sedimentation, mineralogy. Active researcher, member prof. societies. Resume on request.

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BOX 748. EXPLORATION GEOLOGIST, Ph.D. Degrees in mining engineering and geology. 10 years field work with Canadian Geological Survey and Quebec Department of Mines. Teaching experience in physics and geology. Publications, physics and geology. Professional engineer. Six years geologic exploration in Venezuela and Brazil. Desires foreign work.

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BOX 758. GEOLOGIST, M.S., Ph.D. work completed, 32, married, veteran, 4 yrs. experience stratigraphic mineral deposits, sedimentology. Desires petroleum work domestic or foreign.

BOX 761. GEOLOGIST, 34, Canadian, family, 1958 Ph.D. from prominent California university, 10 yrs. excellent experience as staff and district geologist with large independent oil company, presently senior staff geologist. Desires permanent teaching post, preferably mineralogy, sedimentary petrology and related fields at university with good research facilities. Resume of experience, academic qualifications and publications on request.

BOX 762. GEOLOGIST-GEOPHYSICIST, B.S., M.S., Ph.D., specialist in location of stratigraphic traps with ability to interpret and compile seismic, geologic, and paleontologic data; experience in diverse geologic provinces; desire foreign position.

BOX 764. GEOLOGIST, M.S. from Eastern University. Twelve years of experience in petrographic, geological and seismograph interpretative work. Desires employment in either of the above fields or teaching.

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STRATIGRAPHER—M.S. 32, family, 2 yrs. experience in Canada with major oil company. Presently Cathodic Supervisor for Water Company. Desires Geological employment. Donald W. Layton, 4051 Citradora Dr., Spring Valley, California.

BOX 767. GEOLOGIST, Ph.D., currently substituting in temporary vacancy at major eastern university until June 30, 1961, seeks permanent position (assistant prof.), teaching petrology, structural geology, and allied subjects.

BOX 768. GEOLOGIST-MINERALOGIST, Ph.D., 31, family. Three years experience in major oil company research laboratory in fields of X-ray and fluorescence analysis, clay mineralogy and geochemistry of sediments. Broad graduate background in geology. Desires position at college or university. Available immediately.

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POSITIONS WANTED—*Continued*

BOX 770. GEOPHYSICIST, Ph.D. (London), 45, family. Broad physics and maths. background. Experience in exploration, teaching and pure and applied research. Publications in U. S., Canada, UK, and Holland. Reads and speaks French and German. Presently employed as head of a mining geophysical exploration unit. Seeks employment with broader scope. Resume on request.

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BOX 777. GEOPHYSICIST, M.S. in Physics and Mathematics, experience in most basins of the USA, familiar with latest seismic techniques. Some gravity and magnetic experience. Desires position with aggressive independent or small integrated company to head up department. Resume on request.

GEOLOGIST, 32, M.S., Ph.D. work completed, dissertation being subsidized by employer who will pay moving costs to area of appointment and retain as consultant. Desire position to teach Granite and Volcano Tectonics, Igneous Petrology, Structural, Engineering, and Economic Geology, or related subjects at University Level, or Earth Science, Anthropology and Geography courses at Jr. College level. Past Research and Teaching Assistantships, 8 years field and research experience, wide travel, more than 20 discoveries, will bring $12,000 research library. Desires to pass on results of research and experience; settle down to raise some assistants. Available after January 1, 1961. E. Erickson, Box 312, East Ely, Nevada.

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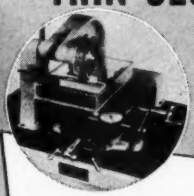

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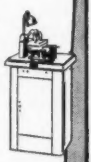

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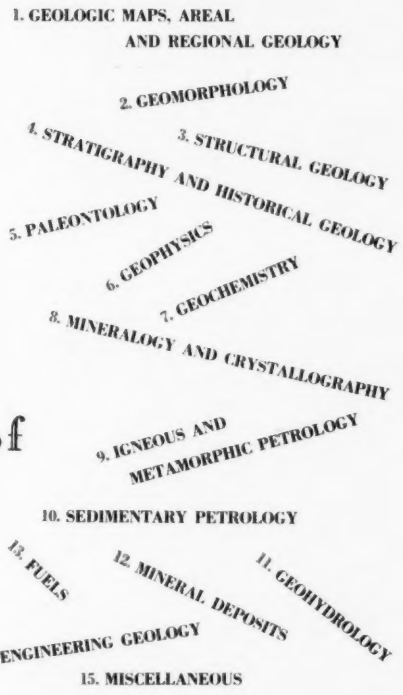

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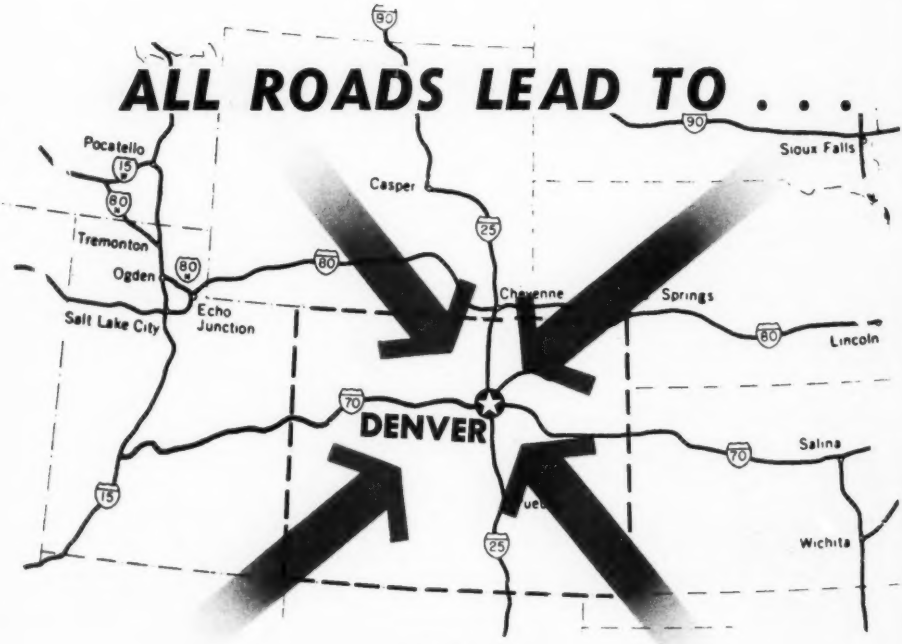

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